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Type: **Parallel**

Precision Timing with the CMS MIP Timing Detector for High-Luminosity LHC

The Compact Muon Solenoid (CMS) detector at the CERN Large Hadron Collider (LHC) is undergoing an extensive Phase 2 upgrade programme to prepare for the challenging conditions of the High-Luminosity LHC (HL-LHC). A new timing detector for CMS will measure minimum ionising particles (MIPs) with a time resolution of about 30-40 ps. The precise timing information from the MIP timing detector (MTD) will reduce the effects of the high levels of pileup expected at the HL-LHC, bringing new capabilities to CMS. The MTD will be composed of an endcap timing layer (ETL), instrumented with low-gain avalanche diodes and read out with the ETROC chip, and a barrel timing layer (BTL), based on LYSO:Ce crystals coupled to SiPMs and read out with the TOFHIR2 chip. This contribution will provide an overview of the MTD design and its expanded physics capabilities, describe the latest progress towards prototyping and production, and show the ultimate results demonstrating the achieved target time resolution.

Secondary track

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